

REMARKS

The Examiner objected to claims 3, 5, 11, 19, 26 and 32. In response, Applicants have amended claims 3, 5, 11, 19, 26 and 32 to clarify the invention.

The Examiner rejected claims 6, 21, 28, 33, 34, and 36-41 under 35 U.S.C. §112, second paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In response, Applicants have amended In response, Applicants have amended claims 6, 21, 28, 33, 36-37, and 39-40 to clarify the invention. to clarify the invention.

The Examiner rejected claims 3, 8, 32, 35 and 43 under 35 U.S.C. §103(a) as allegedly being unpatentable over Shoji et al. (US 5,928,965) in view of Subramanian et al. (US 6,060,380), Avanzino et al. (US 6,121,150), Koch et al. (US 5,413,884) and Ke et al. (US 2002/0066531 A1).

The Examiner rejected claims 4 and 5 under 35 U.S.C. §103(a) as allegedly being unpatentable over Shoji et al. ('965) in view of Subramanian et al. ('380), Avanzino et al. (150), Koch et al. ('884) and Ke et al. ('531 A1) as applied to claims 3, 8, 32, 35 and 43 above, and further in view of Howe et al. (US 6,210,988 B1).

The Examiner rejected claims 11, 14, 19, 26, 30 and 42 under 35 U.S.C. §103(a) as allegedly being unpatentable over Shoji et al. ('965) in view of Subramanian et al. ('380), Avanzino et al. ('150), Koch et al. ('884), Ke et al. ('531 A1) and Howe et al. ('988 B1).

Applicants respectfully traverse the §112 and §103 rejections with the following arguments.

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35 U.S.C. §103(a): Claims 3, 8, 32, 35, and 43

The Examiner rejected claims 3, 8, 32, 35, and 43 under 35 U.S.C. §103(a) as allegedly being unpatentable over Shoji et al. (US 5,928,965) in view of Subramanian et al. (US 6,060,380), Avanzino et al. (US 6,121,150), Koch et al. (US 5,413,884) and Ke et al. (US 2002/0066531A1).

Applicants respectfully contend that claims 3 and 32 are not unpatentable over Shoji in view of Subramanian, Avanzino, Koch and Ke, for at least the following reasons.

A first reason why claims 3 and 32 are not unpatentable over Shoji in view of Subramanian, Avanzino, Koch and Ke is that Shoji in view of Subramanian, Avanzino, Koch and Ke does not teach or suggest the feature: "depositing a layer of metallic germanium over the at least one dielectric layer" (claim 3); and "depositing a layer of germanium over the at least one dielectric layer" (claim 32).

The Examiner alleges that "Koch ... depositing a layer of metallic germanium (44) over a dielectric stack (32, 42)".

In response, Applicants respectfully contend that Koch merely teaches in col. 5, lines 41-45: "Referring to FIG. 7, the exemplary tri-level resist comprises a first layer 42 of a conventional hard-baked photoresist, a second, layer 44 of germanium thinner than first layer 42, and a third layer 46 of an e-beam sensitive resist." Thus, Koch discloses only the structure of the tri-level resist and is totally silent as to how the tri-level resist is formed. Koch most certainly does not disclose "depositing a layer of metallic germanium (44) over a dielectric stack (32, 42)" as alleged by the Examiner. In summary, the Examiner has not cited a single reference that

discloses "depositing a layer of germanium over the at least one dielectric layer", as required by claims 3 and 32. Accordingly, the Examiner has failed to establish a *prima facie* case of obviousness in relation to claims 3 and 32.

A second reason why claims 3 and 32 are not unpatentable over Shoji in view of Subramanian, Avanzino, Koch and Ke is that the Examiner has not supplied a legally persuasive argument as to why a person of ordinary skill in the art would modify Shoji by the alleged teachings of Subramanian and Koch in relation to claims 3 and 32. In particular, established case law requires that the prior art must contain some suggestion or incentive that would have motivated a person of ordinary skill in the art to modify a reference or to combine references. See *Karsten Mfg. Corp. V. Cleveland Gulf Co.*, 242 F.3d 1376, 58 U.S.P.Q.2d 1286, 1293 (Fed. Cir. 2001 ("In holding an invention obvious in view of a combination of references, there must be some suggestion, motivation, or teaching in the prior art that would have led a person of ordinary skill in the art to select the references and combine them in a way that would produce the claimed invention"). See also *In re Gordon*, 733 F.2d 900, 902, 221 U.S.P.Q. 1125, 1127 (Fed. Cir. 1984 ("The mere fact that the prior art could be so modified would not have made the motivation obvious unless the prior art suggested the desirability of the modification.")).

Noting that the Examiner has modified the patterning methodology of Shoji to include the hard mask layer in the patterning methodology of Subramanian, the Examiner has not provided any motivation in the prior art for said modification of adding the hard mask layer. Applicants respectfully contend that use of the hard mask layer adds extra process steps with consequent added complexity, added expense, and added fabrication time. Thus, the Examiner's failure to

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provide motivation for this modification, as found in the prior art, is most certainly not legally persuasive. By not citing any suggestion or incentive in the prior art for making this modification, the Examiner has failed to establish a *prima facie* case of obviousness in relation to claims 3 and 32.

Noting that the Examiner has modified the hard mask layer Subramanian to include germanium as taught by Koch which in turn modifies the patterning methodology of Shoji, the Examiner has not provided any motivation in the prior art for said modification of including germanium in the hard mask layer. By not citing any suggestion or incentive in the prior art for making this modification, the Examiner has failed to establish a *prima facie* case of obviousness in relation to claims 3 and 32.

A third reason why claims 3 and 32 are not unpatentable over Shoji in view of Subramanian, Avanzino, Koch and Ke is that the Examiner's argument with respect to Koch is an improper modification of the secondary reference of Subramanian. The Examiner argues that the primary reference of Shoji discloses a method for forming a trench in a substrate, including patterning a dielectric layer on the substrate. The Examiner also argues that the secondary reference of Subramanian has modified the primary reference of Shoji by alleging that Subramanian teaches or suggests including a hard mask layer in the patterning method of Shoji. The Examiner additionally argues that the secondary reference of Koch has modified the secondary reference of Subramanian, by alleging that Koch teaches or suggests including germanium in the hard mask layer of Subramanian. Applicants maintain that it is improper to argue that a claim feature is taught or suggested by a secondary reference through modification of

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another secondary reference. If the Examiner could modify a secondary reference in the preceding manner, then the Examiner would be able to show the existence of any element or feature of any claim merely by chaining a sufficient number of secondary references together in the preceding manner. Accordingly, Applicants respectfully maintain that the rejection of claim 3 and 32 under 35 U.S.C. §103(a) is improper and should be withdrawn. Accordingly, the Examiner has failed to establish a *prima facie* case of obviousness in relation to claims 3 and 32.

Based on the preceding arguments, Applicants respectfully maintain that claims 3 and 32 are not unpatentable over Shoji in view of Subramanian, Avanzino, Koch and Ke, and that claims 3 and 32 are in condition for allowance. Since claims 8 and 35 depend from claim 3, Applicants contend that claims 8 and 35 are likewise in condition for allowance. Since claim 43 depends from claim 32, Applicants contend that claim 43 is likewise in condition for allowance.

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35 U.S.C. §103(a): Claims 4-5

The Examiner rejected claims 4 and 5 under 35 U.S.C. §103(a) as allegedly being unpatentable over Shoji et al. ('965) in view of Subramanian et al. ('380), Avanzino et al. (150), Koch et al. ('884) and Ke et al. ('531 A1) as applied to claims 3, 8, 32, 35 and 43 above, and further in view of Howe et al. (US 6,210,988 B1).

Since claims 4-5 depend from claim 3, which Applicants have argued *supra* to be patentable under 35 U.S.C. §103(a) over Shoji in view of Subramanian, Avanzino, Koch and Ke, Applicants maintain that 4-5 are likewise not unpatentable under 35 U.S.C. §103(a) over Shoji in view of Subramanian, Avanzino, Koch and Ke, and further in view of Howe.

35 U.S.C. §103(a): Claims 11, 14, 19, 26, 30, and 42

The Examiner rejected claims 11, 14, 19, 26, 30, and 42 under 35 U.S.C. §103(a) as allegedly being unpatentable over Shoji et al. ('965) in view of Subramanian et al. ('380), Avanzino et al. ('150), Koch et al. ('884), Ke et al. ('531 A1) and Howe et al. ('988 B1).

Applicants respectfully contend that claims 3 and 32 are not unpatentable over Shoji in view of Subramanian, Avanzino, Koch, Ke and Howe, for at least the following reasons.

A first reason why claims 11, 19, and 26 are not unpatentable over Shoji in view of Subramanian, Avanzino, Koch, Ke and Howe is that Shoji in view of Subramanian, Avanzino, Koch, Ke and Howe does not teach or suggest the feature: "depositing a metallic germanium layer on a dielectric stack" (claim 11); "depositing a layer of metallic germanium having a thickness equal to or greater than approximately 40nm over the dielectric stack (claim 19); and "depositing a layer of germanium over the at least one dielectric layer" (claim 32).

The Examiner alleges that "Koch ... teach the steps of depositing a layer of metallic germanium (44) over a dielectric stack (32, 42)".

In response, Applicants respectfully contend that Koch merely teaches in col. 5, lines 41-45: "Referring to FIG. 7, the exemplary tri-level resist comprises a first layer 42 of a conventional hard-baked photoresist, a second, layer 44 of germanium thinner than first layer 42, and a third layer 46 of an e-beam sensitive resist." Thus, Koch discloses only the structure of the tri-level resist and is totally silent as to how the tri-level resist is formed. Koch most certainly does not disclose "depositing a layer of metallic germanium (44) over a dielectric stack (32, 42)" as alleged by the Examiner. In summary, the Examiner has not cited a single reference that

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discloses "depositing a layer of germanium over the at least one dielectric layer", as required by claims 11, 19, and 26. Accordingly, the Examiner has failed to establish a *prima facie* case of obviousness in relation to claims 11, 19, and 26.

A second reason why claims 11, 19, and 26 are not unpatentable over Shoji in view of Subramanian, Avanzino, Koch, Kc and Howe is that the Examiner has not supplied a legally persuasive argument as to why a person of ordinary skill in the art would modify Shoji by the alleged teachings of Subramanian and Koch in relation to claims 11, 19, and 26. In particular, established case law requires that the prior art must contain some suggestion or incentive that would have motivated a person of ordinary skill in the art to modify a reference or to combine references. See *Karsten Mfg. Corp. V. Cleveland Gulf Co.*, 242 F.3d 1376, 58 U.S.P.Q.2d 1286, 1293 (Fed. Cir. 2001) ("In holding an invention obvious in view of a combination of references, there must be some suggestion, motivation, or teaching in the prior art that would have led a person of ordinary skill in the art to select the references and combine them in a way that would produce the claimed invention"). See also *In re Gordon*, 733 F.2d 900, 902, 221 U.S.P.Q. 1125, 1127 (Fed. Cir. 1984) ("The mere fact that the prior art could be so modified would not have made the motivation obvious **unless the prior art suggested the desirability of the modification.**").

Noting that the Examiner has modified the patterning methodology of Shoji to include the hard mask layer in the patterning methodology of Subramanian, the Examiner has not provided any motivation in the prior art for said modification of adding the hard mask layer. Applicants respectfully contend that use of the hard mask layer adds extra process steps with consequent

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added complexity, added expense, and added fabrication time. Thus, the Examiner's failure to provide motivation for this modification, as found in the prior art, is most certainly not legally persuasive. By not citing any suggestion or incentive in the prior art for making this modification, the Examiner has failed to establish a *prima facie* case of obviousness in relation to claims 11, 19, and 26.

Noting that the Examiner has modified the hard mask layer Subramanian to include germanium as taught by Koch which in turn modifies the patterning methodology of Shoji, the Examiner has not provided any motivation in the prior art for said modification of including germanium in the hard mask layer. By not citing any suggestion or incentive in the prior art for making this modification, the Examiner has failed to establish a *prima facie* case of obviousness in relation to claims 11, 19, and 26.

A third reason why claims 11, 19, and 26 are not unpatentable over Shoji in view of Subramanian, Avanzino, Koch, Ke and Howe is that the Examiner's argument with respect to Koch is an improper modification of the secondary reference of Subramanian. The Examiner argues that the primary reference of Shoji discloses a method for forming a trench in a substrate, including patterning a dielectric layer on the substrate. The Examiner also argues that the secondary reference of Subramanian has modified the primary reference of Shoji by alleging that Subramanian teaches or suggests including a hard mask layer in the patterning method of Shoji. The Examiner additionally argues that the secondary reference of Koch has modified the secondary reference of Subramanian, by alleging that Koch teaches or suggests including germanium in the hard mask layer of Subramanian. Applicants maintain that it is improper to

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argue that a claim feature is taught or suggested by a secondary reference through modification of another secondary reference. If the Examiner could modify a secondary reference in the preceding manner, then the Examiner would be able to show the existence of any element or feature of any claim merely by chaining a sufficient number of secondary references together in the preceding manner. Accordingly, Applicants respectfully maintain that the rejection of claim 11, 19, and 26 under 35 U.S.C. §103(a) is improper and should be withdrawn. Accordingly, the Examiner has failed to establish a *prima facie* case of obviousness in relation to claims 11, 19, and 26.

Based on the preceding arguments, Applicants respectfully maintain that claims 11, 19, and 26 are not unpatentable over Shoji in view of Subramanian, Avanzino, Koch, Ke and Howe, and that claims 11, 19, and 26 are in condition for allowance. Since claim 14 depends from claim 11, Applicants contend that claim 14 is likewise in condition for allowance. Since claims 30 and 42 depend from claim 26, Applicants contend that claims 30 and 42 are likewise in condition for allowance.

CONCLUSION

Based on the preceding arguments, Applicants respectfully believe that all pending claims and the entire application meet the acceptance criteria for allowance and therefore request favorable action. If the Examiner believes that anything further would be helpful to place the application in better condition for allowance, Applicants invites the Examiner to contact Applicants' representative at the telephone number listed below.

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